

Antiferromagnetic Hysteresis above the Spin Flop Field

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Antiferromagnetic materials have attracted a lot of attention recently due to their unique properties that create potential applications in spintronics such as data storage or long-distance spin transport. The anisotropy plays a critical role in determining the magnetic configuration of AFs. In this work, we experimentally addressed the anisotropy of thin film antiferromagnetic CoO with adjacent Pt by spin Hall magnetoresistance. Spin flop transition and spin canting are reflected in electrical signal in agreement with the macrospin model. Unexpectedly, hysteretic behaviour in the angular dependence of magnetoresistance is detected above spin flop field and persist up to the highest tested magnetic fields (30 T). It indicates that the Néel vector cannot be aligned parallel to a hard axis with magnetic field few times larger than the spin flop field (7 T). The introduction of an effective spin flop field that is not a constant parameter but depends on the external magnetic field yields good agreement with the experimental results. It suggests that anisotropy in CoO can be modified by the magnetic field.

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